

REVISION OF GUILLEMINEA (BRAYULINEA)
INCLUDING GOSSYPIANTHUS
(AMARANTHACEAE)

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The correctness of the name *Guilleminea* HBK and the relation of that genus to *Gossypianthus* Hooker have been unclear since the original descriptions. Until the revision of rules of nomenclature in 1939, *Guilleminea* was not clearly correct. Before 1939, there had been a switching of species from *Guilleminea* to *Gossypianthus* and from *Gossypianthus* to *Guilleminea* and *Brayulinea* Small. Thus there is a lengthy synonymy of nearly every species. The species exhibit great variation in macroscopic structures, and forms of one species often look more like certain forms of another species than like each other; in many herbaria the specimens are mislabeled. Examination of the calyx under a good lens is the only way to be sure of the determination.

A study of 335 specimens labeled variously *Guilleminea*, *Gossypianthus*, and *Brayulinea* has resulted in revisions of *Guilleminea* and *Gossypianthus* and their combination under *Guilleminea* HBK emend. Mears. The discussion included with each taxon described here should explain the nomenclatural and morphological bases for them.

Previously *Guilleminea* has been separated as a monogeneric tribe of the Gomphrenoideae; its combination with *Gossypianthus* places it in the Gomphreneae. A key to the New World genera of the Gomphrenoideae is given after the descriptions.

GUILLEMINEA HBK emend. MEARS

Perennial herbs, rarely becoming woody; stems often procumbent, lanate to nearly glabrous; leaves opposite, extremely variable in size, shape, and pilosity; 3 kinds of leaves on a plant—large radical leaves, fairly large cauline leaves subtending each node, and tiny leaves subtending each spike; radical rosette leaves persisting or withering before anthesis, 10-95 mm. long by 3-15 mm. wide, linear to spatulate or oblanceolate and acute or obtuse; radical leaves rarely without a winged petiole varying in size and usually lacking chlorophyll; cauline leaves 2-30 mm. long by 1-10 mm. wide, linear acute to spatulate or ovate and obtuse; cauline leaves with a wide, winged petiole. Inflorescence a single flower or a spike of 2-30 flowers; spikes often densely aggregated at nodes; each flower sessile with 2 bracts and a bractlet, below which a pedicel (subtended by two tiny leaves) extends to a stem; involucre persistent; flowers hermaphroditic, 5-merous; petals 0; calyx rotate to erect, depending on the amount of rigid sepal tissue in the free calyx

segments; calyx covered with silky hairs developing from the rigid sepal tissue; sepals 5, 2 more concave than the other 3, except when the calyx is fused; calyx segments with a sterile membranous fringe varying in area from less than 5% of the sepal in some *G. lanuginosa* to more than 90% of the total calyx lobe area in some *G. densa*; sepals trinerved and often chlorophyllous; 5 filaments united into a tube, either free from the calyx and cuplike around the base of the pistil or adnate to the fused calyx for 75-100% the length of the filament tube; free filament lobes ovate to linear and acute; anthers unilocular; staminodia and pseudostaminodia absent; style 1, usually short, but extended in *G. Brittonii*; stigma capitate and always bilobed. Fruit a membranous, indehiscent capsule; ovary unilocular with a single, apically pendulous ovule; ovule vertical, ovoid, somewhat reniform; endosperm central and farinose; embryo annular peripheral, and with the radicle ascending.

TYPE: *Guilleminea illecebroides* (Willd.) HBK (now included in *Guilleminea densa* (Willd.) Moq.)

Guilleminea HBK was rejected as a valid generic name by Small in 1903 because of the existence of the name *Guilleminea* Necker. The botanical congress of 1939 adopted a ruling which declared Necker's use of uninomials illegitimate; thus *Guilleminea* HBK is valid. The newly combined genus must be called *Guilleminea* because *Gossypianthus* was described 17 years later.

Guilleminea has been separated from *Gossypianthus* primarily because of the adnation of the filament tube to the fused calyx in the former genus; studies of all the published species and varieties of the two taxa support five major conclusions:

1) in both taxa the filaments are always united, but the degree of coalescence is variable;

2) the free filament lobes in *Gossypianthus* often are nearly enclosed by the concavity of the sepals;

3) the degree of coalescence of the calyx is sequentially variable: in *G. australis* the calyx tissue is coalescent slightly below the top of the adnation of the filament tube to the calyx; in *G. densa* var. *densa* the calyx tissue is coalescent at least as high and often higher than the highest filament tube adnation;

4) there is a clear continuity in the proportional decrease in the area of rigid calyx tissue and increase in the area of membranous fringe in the total area of the calyx segments (see Figure 1);

5) although there is only one fairly complete transition between the two taxa, there are other transitions suggested by the macroscopic similarity of certain forms of *Guilleminea* to certain forms of *Gossypianthus*. The simplicity of the one clear transition indicates that such transitions might have occurred more than once.

The range of the genus *Guilleminea* is the southwestern United States,

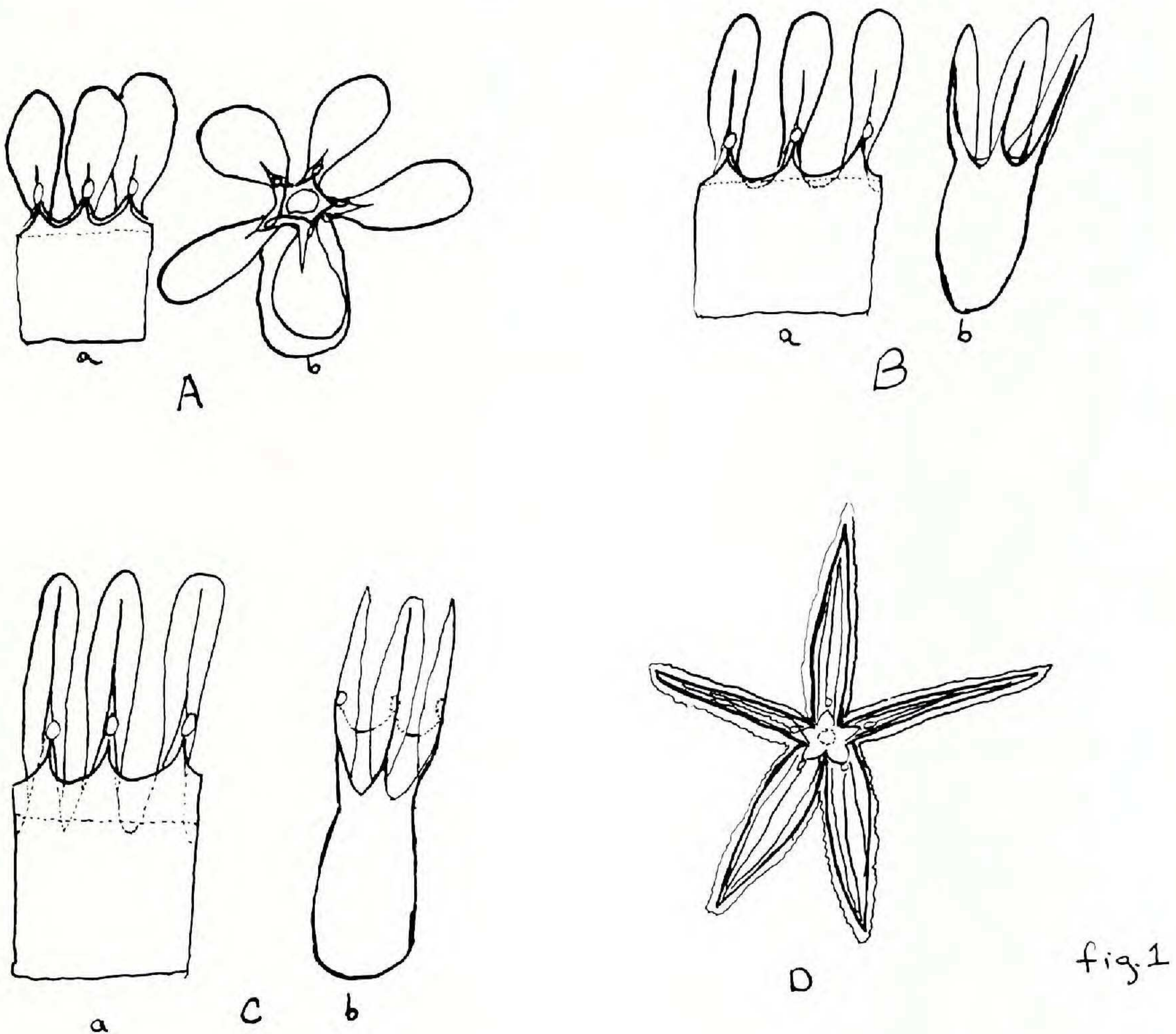


Figure 1. A. *Guilleminea densa* var. *densa*—a, cutaway showing filament tube - calyx relationship, and b, the exterior appearance of the flower. B. *Guilleminea densa* var. *gracilis*—a, cutaway showing filament tube - calyx relationship, and b, the exterior appearance of the flower. C. *Guilleminea australis*—a, cutaway showing filament tube - calyx relationship, and b, the exterior appearance of the flower. D. General appearance of the filament tube and calyx of Subgenus *Gossypianthus* when the flower is forced open.

central to northern Mexico, Haiti, the Dominican Republic, Cuba, and northwestern and north central South America. The ranges of the species and varieties are given with the respective descriptions.

Key to the Subgenera of *Guilleminea*

- 1a. Filament tube adnate to the calyx.....I. Subgenus *Guilleminea*
 1b. Filament tube free from the calyx.....II. Subgenus *Gossypianthus*

1. Subgenus GUILLEMINEA

Guilleminea HBK in Nov. Gen. et Sp. vi, 40, 518 (1823).

Guilleminea Reichb. Consp. 161 (1828), orthogr. var.

Brayulinea Small in Flora of the SE. U.S., ed. 1, 394 (1903).

Radical leaves present as a winter rosette, but rarely persistent until time of fruiting; filament tube united with the calyx; calyx fused from slightly below to slightly above the top of the filament tube adnation to the calyx.

TYPE SPECIES: *Guilleminea illecebroides* (Willd.) HBK (= *Guilleminea densa* (Willd.) Moq.)

The only way to identify this subgenus is to examine the minute calyx. Several specimens with a persistent radical rosette have been observed; the size and shape of the cauline leaves is just as variable as that of the cauline leaves of the other subgenus. Only within the subgenera can the leaves be used to distinguish taxa.

The subgenus is fairly common from Oklahoma to central Mexico. It has not been observed from Haiti, the Dominican Republic, or Cuba. This subgenus is the only one reported from South America.

Key to the Species of Subgenus *Guilleminea*

- 1a. Flowers less than 2.5 mm. long at maturity; calyx rotate or erect 2
 2a. Filament tube never more than 0.2 mm. above the level of highest adnation to the calyx; calyx often rotate; sepal nerve less than 2/3 the length of the free calyx lobe, rarely chlorophyllous 1. *G. densa*
 2b. Filament tube rising 0.5 mm. above the level of highest adnation to the calyx; calyx erect; calyx lobes with single prominent green nerves extending nearly the length of the calyx lobes 2. *G. australis*
 1b. Flowers more than 3.5 mm. long at maturity; calyx rotate; entire filament tube adnate to calyx 3. *G. elongata*

1. GUILLEMINEA DENSA (Willd.) Moq. in DC. Prod. xiii, II, 338 (1849).

Illecebrum densum Willd. in Roem. & Sch. Syst. v. 517 (1819).

Illecebrum alsinaefolium Pavon ex Moq. in DC. Prod. xiii, II, 339 (1849).

Guilleminea illecebroides HBK in Nov. Gen. et Sp. vi, 41 (1823).

Guilleminea Illecebrum Spreng. Syst. iv, Cur. Post., 103 (1825).

Guilleminea densa b. *alsinaefolia* (Pavon) Moq. in DC. Prod. xiii, II, 339 (1849).

Achyranthes conferta Ruiz in Mart. Fl. Bras. v, I, 223 (1840).

Brayulinea densa (Willd.) Small in Fl. SE. U.S., ed. 1, 394 (1903).

Radical leaves 20-25 mm. long by 10-13 mm. wide and lanceolate to spatulate, acute, rarely persisting until fruiting; cauline leaves lanceolate and 3-20 mm. long by 1.5-5 mm. wide; rarely more than 10 flowers grouped into a small capitulum or cylindrical spike; calyx rotate in North American plants and occasionally rotate in South American

specimens; sepals united into a 5-part calyx; each calyx lobe with the central sepal nerve continuing less than $\frac{2}{3}$ the length of the free calyx lobe, which is a hyaline membrane except for the sepal nerve; nerve usually without chlorophyll; filament tube barely visible above the level of adnation to the calyx.



Figure 2. DISTRIBUTION OF SUBGENUS GUILLEMINEA. Hollow square, *G. densa* var. *densa*; solid square, *G. densa* var. *humilis*; hollow triangle, *G. densa* var. *aggregata*; solid triangle, *G. australis*; open circle, *G. densa* var. *gracilis*; solid circle, *G. elongata*.

Moquin (1849) described *Guilleminea densa* b. *alsinaefolium* from Pavon's annotation *Illecebrum alsinaefolium*. No locality was given for the variety which was characterized merely as smaller and more fragile than the type variety. Bray and Uline (1895) reduced it to synonymy with var. *densa* without comment. This study has produced no variety which could be distinguished by Moquin's vague description.

A photograph taken in the Berlin Herbarium of the type of *Guilleminea* and a fragment of Mendez' first collection from Mexico were used to determine that both plants are the same. Further comparisons with collections from Mexico and South America verified that the most fragile variety from those areas is the type variety. The photograph of the type was particularly helpful in confirming Moquin's report that the calyxes of the type variety collected in Ecuador are rotate, so that those collections are not the plant from the same area later called *Guilleminea gracilis* Fries.

Collections have been observed from Cimarron Co., Oklahoma, to Oaxaca, Mexico, and from southern Colombia to Cordoba, Argentina. The main areas collected are extreme West Texas, New Mexico, Arizona, and Chihuahua, Mexico, in North America and southern Bolivia to northern Argentina in South America.

Key to the Varieties of *Guilleminea densa*

- 1a. Most leaves and flowers produced on ascendent or procumbent stems with obvious internodes 2
- 2a. Leaves and flowers not densely aggregated at the nodes; mature flowers less than 1.5 mm. long 3
- 3a. Calyx rotate at maturity; central sepal nerve less than $\frac{1}{2}$ the length of the free lobe var. *densa*
- 3b. Calyx erect because the rigid sepal nerve extends more than $\frac{1}{2}$ the length of the free lobe; nerve sometimes green. var. *gracilis*
- 2b. Leaves and flowers densely aggregated at nodes on the thick stems; flowers 1.8-2.2 mm. long at maturity var. *aggregata*
- 1b. Leaves and flowers completely covering a thick, spreading, horizontal area; stems rarely visible. var. *humilis*

GUILLEMINEA DENSA var. DENSA

Cauline leaves 3-20 mm. long by 5-12 mm. wide and ovate to spatulate, acute or obtuse; inflorescence usually 5-10 flowers in a spiralled, cylindrical spike; flowers less than 1.5 mm. long at maturity of fruit; calyx rotate at maturity; sepal lobes almost entirely membranous, with the central colorless nerve continuing less than $\frac{1}{2}$ the length of the free calyx lobe; calyx lobes spatulate.

This variety intergrades with var. *aggregata*. In these determinations the larger size of the flowers and the denser nodes of var. *aggregata* are important. If the specimen was collected early in the flowering season (February to November in northern areas), the nodes of flowers may

be insufficiently developed to permit careful determination. The shape and size of the leaves subtending each node of aggregation are not good characters because both varieties show great variation.

In North America this variety is the most common; it has been collected frequently from Travis Co., Texas, to the Federal District, Mexico. In South America this variety is much rarer than var. *gracilis*; it has been collected in Bolivia and Ecuador.

GUILLEMINEA DENSA var. **humilis** Mears, var. nov.

Planta musciformis; caules ascendentes rari vel nulli; alae petiolares foliorum caulinarum laminas latitudine aequantes.

Plants appearing like pads of moss; stems usually short and hidden by a dense congestion of flowers and leaves in no apparent nodes; petioles of the cauline leaves as wide as the leaves and without chlorophyll.

This variety is closely related to var. *densa*; the flowers are extremely similar. The peculiar growth habit is the chief distinction. This variety is defined from three collections from central Mexico: the holotype, *E. Lyonnet 107* from Pedregal de San Angelo, D.F., August, 1927; and two paratypes, *G. Arséne 8849* from Glacoquemaca, D.F., October 16, 1913, and *J. Mears 208* from Zimapan, Hidalgo, July 4, 1966. The two earlier collections are in NY and the last is at TEX.

GUILLEMINEA DENSA var. **gracilis** (Fries) Mears, comb. nov.

Guilleminea gracilis Fries, Nov. Acta Reg. Soc. Sci. Upsala, ser. 4, 1(#1):153 (1905).

Brayulinea gracilis (Fries) Schinz in Engler & Prantl, Nat. Pfl., ed. 2, 16c:65 (1934).

Inflorescence a capitulum of 3-7 flowers; each flower on a very short pedicel; flowers less than 1.5 mm. long at maturity; calyx erect; calyx lobes usually narrowly spatulate and concave; calyx lobes membranous except for the obvious central sepal nerve often extending more than $\frac{3}{4}$ the length of the calyx lobe; calyx often not coalescent as high as the top of the adnation of the filament tube to the calyx.

This variety is almost isolated geographically from var. *densa*; although the type locality of var. *densa* is Ecuador, var. *gracilis* is the predominant form of *Guilleminea* found in South America. The general resemblance of the two varieties is great; from Ecuador and Bolivia there are specimens which could be considered intermediates. The length of the calyx nerve and the resulting erectness of the calyx in var. *gracilis* are the main distinctive characters. Because the specimens are so similar and because probable intermediates have been observed, Fries' species is considered a variety of *Guilleminea densa*. As early as 1937 K. Suessenguth recognized a new variety of *G. densa* from Ecuador and Bolivia; he labeled several specimens with a name apparently inedited. This study failed to find any published reference to his variety. Another name for the variety has been used because Suessen-

guth's name would be confused with that of a much more common species of *Guilleminea*.

This is the southernmost variety of *Guilleminea*. It has been observed from Colombia, Peru, Ecuador, and Argentina. The type is from Argentina.

GUILLEMINEA DENSA var. **AGGREGATA** Uline and Bray in Bot. Gaz. 20:343 (1895).

Plants larger and more robust than var. *densa*; leaves subtending the nodes often very large and ovate; flowers and leaves densely aggregated on thick stems; flowers 1.8-2.2 mm. long at maturity.

There are many intermediates of var. *densa* and var. *aggregata*; they are not geographically separated. Often very robust specimens of var. *densa* are produced, yet they do not have the dense aggregation at the nodes and the larger flowers. The larger size of the cauline leaves of var. *aggregata* is not distinctive. Only when the larger flowers are present with the densely aggregated condition can the specimen be identified clearly as var. *aggregata*.

This variety is centered farther South than var. *densa*. It is fairly common in Jeff Davis Co., Texas, Chihuahua, New Mexico, and Arizona; but it is more frequent in Coahila, Oaxaca, Jalisco, and the Federal District of Mexico.

2. GUILLEMINEA AUSTRALIS (Griseb.) Hooker f. in Benth. & Hook. Gen. iii, 37 (1883).

Gossypianthus australis Griseb. in Goett. Abh., xix, 8 (1874).

Brayulinea australis (Griseb.) Schinz in Engl. & Prantl, Nat. Pfl., ed. 2, 16c: 65 (1934).

Leaves and flowers not densely compacted; cauline leaves 8-10 mm. long by 3-4 mm. wide, lanceolate to ovate and acute; calyx less than 2.5 mm. long at maturity; each calyx lobe with a prominent chlorophyllous nerve almost the full length of the calyx lobe; membranous fringe around the calyx nerve constituting about 60% of the total calyx lobe area; calyx tissue connecting the sepals below the level at which the filament tube is adnate; the filament tube rising about 0.5 mm. above the fused calyx (like a corona).

This species might be considered a variety of *G. densa*, but an insufficient number of specimens have been collected to observe the degree of variation in *G. australis* or the amount of its intergradation with any other taxa. This species exhibits characters showing the relationship of Subgenus *Guilleminea* to Subgenus *Gossypianthus*: 1) the rigid sepal tissue of the calyx lobe constitutes a greater percentage of the free sepal area than in the rest of the Subgenus *Guilleminea* and a lesser percentage than in the Subgenus *Gossypianthus*; 2) the calyx is primarily adnate to the filament tube and secondarily fused as a result of calyx tissue developing across the bridge provided by the filament tissue. These characters demonstrate some continuity between the sub-

genera and provide a basis for studying the relations of the species and varieties.

This species has been collected in Jujuy Province, Argentina, and in western Paraguay. The type is from Argentina.

3. *GUILLEMINEA elongata* Mears, sp. nov.

Folia sessilia, subglabra; folia radicalia 12-16 mm. longa, 4-5 mm. lata, lanceolato-acutata, persistentia; folia caulina 4-5 mm. longa, 2-3 mm. lata, ovata vel lanceolato-acutata; flores 3.5-5.0 mm. longi, hypocrateriformes; lacinae minus quam 1.7 mm. longae.

Leaves sessile and nearly glabrous; radical leaves 12-16 mm. long by 4-5 mm. wide, lanceolate acute, persistent; cauline leaves 4-5 mm. long by 3-4 mm. wide and ovate or lanceolate and acute; 3-7 flowers in axillary capitula; involucre lightly pubescent; flowers 3.5-5.0 mm. long and tubular rotate; calyx lobes less than 1.7 mm. long; nerve of the sepal lobe less than $\frac{1}{2}$ the length of the lobe, without chlorophyll; stamens coalescent into tube completely adnate to the fused calyx; filament lobes partially enclosed by the sepal lobes.

Only one collection of this new species has been seen, yet its characters are so distinct that it could be referred to no other species. The type and only specimen observed is from Tambores, Tacuarembó, Uruguay (*W. G. Herter* 982, 1937 (NY)).

II. Subgenus *Gossypianthus* (Hooker) Mears, comb. nov.

Gossypianthus Hooker, *l.c. Pl.*, iii, t. 251 (1840)

Radical leaves usually persistent until anthesis; calyx erect, composed of 5 free sepals (2 smaller and more concave than the others); each sepal with 3 green nerves (often bleached by sun and rain); filaments united into a basal cup free from the calyx; filaments usually nearly enclosed by the concavity of the sepals.

TYPE: *Gossypianthus rigidiflorus* Hooker, *l.c.* (= *Guilleminea lanuginosa* var. *rigidiflora* (Hooker) Mears)

Gossypianthus has been combined with *Guilleminea* because there is a continuity of calyx variation, there is a continuity in the variation of the degree of filament tube association with the calyx, and there is considerable difficulty in distinguishing the subgenera without a lens. This subgenus occurs from Oklahoma to southern Tamaulipas and in Cuba, Haiti, and the Dominican Republic.

Key to the species of Subgenus *Gossypianthus*

- 1a. Stems all originating above ground; style 0.1-0.3 mm. long at maturity of fruit 4. *G. lanuginosa*
 1b. Basal stems usually below ground; style 0.5-0.8 mm long at maturity of fruit 5. *G. Brittonii*

4. *GUILLEMINEA LANUGINOSA* (Poir.) Hooker f. in Benth. & Hook. *Gen. Pl.*, iii, 37 (1883).

Paronychia lanuginosa Poir. *Encyl. Suppl.* 4:303 (1816).

Gossypianthus lanuginosus (Poir.) Moq. in DC. Prod. xiii, II, 337 (1849).

Illecebrum lanuginosum Poir. ex Moq. in DC. Prod. xiii, II, 338 (1849).

Illecebrum lanatum Hort. Par. ex Moq. in DC. Prod. xiii, II, 337 (1849).

Celosia piloselloides Poit. ex Moq. in DC. Prod. xiii, II, 338 (1849).

Achyranthes piloselloides Poit. ex Moq. in DC. Prod. xiii, II, 338 (1849).

All fertile stems originating above ground; stems rarely flexuous, often procumbent but sometimes ascendent; radical leaves 10-90 mm. long by 3-10 mm. wide, lanceolate to spatulate, acute or obtuse; radical leaves with a widely winged petiole without chlorophyll; inflorescence a small spike or capitulum of 6-12 flowers, axillary; erect calyx with lanate lobes, fringed with a sterile persistent membrane accounting for less than 10% of the total calyx area; sepals trinerved; filaments free; style no more than 0.3 mm. long.

After Moquin described *Gossypianthus lanuginosus* in 1849, there were efforts to combine Hooker's two species with Moquin's. On the published advice of S. Watson (1883) and J. Torrey (1859), who both admitted no examination of Hooker's species *tenuiflorus*, Bray and Uline (1895) published the combination. It was their opinion that Hooker's species *rigidiflorus* showed so much variation in pilosity and leaf size and shape that all the described specimens could come under that description. Without modifying the description, they called all the specimens *G. lanuginosus*.

Moquin recognized all three species in 1849; but since 1895 Hooker's species has been distinguished generally from *G. lanuginosus* without a published precedent. Hooker's species *rigidiflorus* has been assumed synonymous with *G. lanuginosus* (but not by Standley in *North American Flora*). The following are the results of the study of the complex:

1) this complex is best described as one variable species with four distinct varieties;

2) most of the plants of Oklahoma, Texas, and Mexico differ from Moquin's species and correspond with Hooker's two descriptions.

The name *Guilleminea lanuginosa* is attributed to Hooker f. because he referred both *Gossypianthus australis* Griseb. and *Gossypianthus lanuginosus* (Poir.) Moq. to *Guilleminea* in 1883. However there was no effort to combine the genera, for he retained his father's two species in *Gossypianthus*.

Specimens of this species have been collected from Arkansas and Oklahoma to Tamaulipas and Nuevo Leon and from Haiti and the Dominican Republic.

Key to the Varieties of *Guilleminea lanuginosa*

1a. Plant not densely pilose; radical leaves usually 20-90 mm. long by

- 3-6 mm. wide, lanceolate to linear, acute 2
- 2a. Longest radical leaves 15-25 mm. long; plants low, stems procumbent; cauline leaves often pilose, 5-8 mm. long by 3-4 mm. wide. var. *lanuginosa*
- 2b. Longest radical leaves usually 40-90 mm. long, often linear; plants large, often with ascendent stems; plants often nearly glabrous. var. *tenuiflora*
- 1b. Plant usually densely pilose with long silky hairs; radical leaves usually 20-80 mm. long by 5-15 mm. wide, oblanceolate and acute to spatulate and obtuse. 3
- 3a. All leaves very large; radical leaves 30-85 mm. long by 6-12 mm. wide, oblanceolate; cauline leaves 15-20 mm. long by 8-10 mm. wide, spatulate to ovate; leaves densely aggregated on thick stems var. *Sheldoni*
- 3b. Some cauline leaves small, 7-12 mm. long by 3-10 mm. wide; radical leaves 16-60 mm. long by 5-10 mm. wide, spatulate to oblanceolate; leaves not densely aggregated as in above. var. *rigidiflora*

GUILLEMINEA LANUGINOSA var. **LANUGINOSA**.

Plant rarely larger than 10 cm. high; radical leaves 10-25 mm. long by 4-6 mm. wide, lanceolate to oblanceolate and acute; stems sometimes flexuous, sometimes ascendent; cauline leaves 5-8 mm. long by 3-4 mm. wide.

This variety has been collected rarely in North America; the specimens so commonly labeled this variety are usually var. *rigidiflora*. Where the two varieties concur there is intergradation. This variety has been observed from extreme southern Texas, Tamaulipas, Haiti, and the Dominican Republic. The type is from Haiti, and this variety is the only one collected from Haiti and the Dominican Republic.

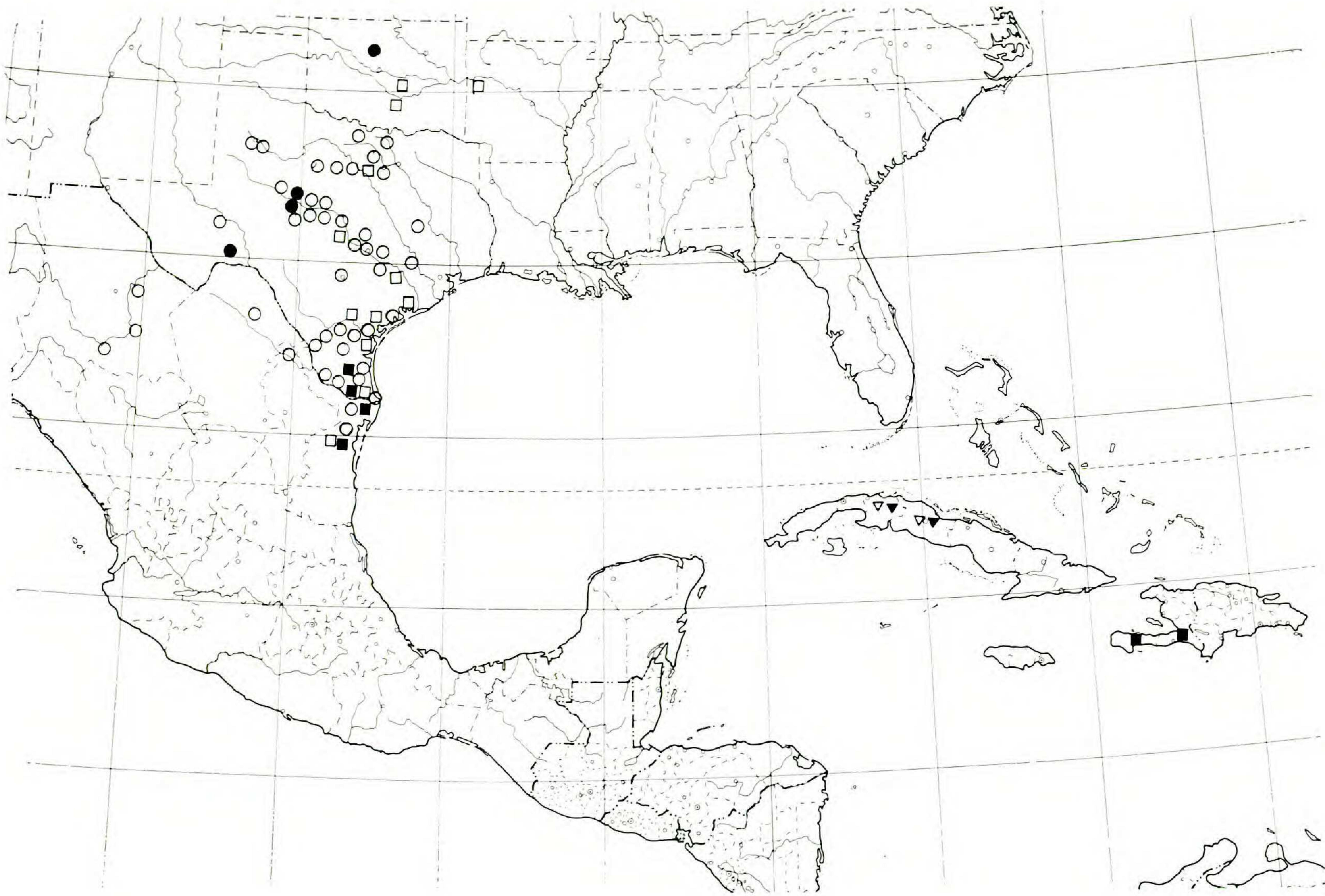
GUILLEMINEA LANUGINOSA var. **tenuiflora** (Hooker) Mears, comb. nov.

Gossypianthus tenuiflorus Hooker, Ic. Pl., iii, t. 251 (1840).

Radical leaves 30-90 mm. long by 3-6 mm. wide, linear to lanceolate, acute; cauline leaves 8-18 mm. long by 4-6 mm. wide, lanceolate to oblanceolate, acute; leaves nearly glabrous at anthesis; nodes of inflorescences farther apart than in other varieties; marginal membranes on sepals somewhat wider than those of var. *lanuginosa*.

If good representatives of this taxon had been observed by Watson, Torrey, and Uline and Bray, they probably would not have reduced it to synonymy with *G. lanuginosa*. Much was written about the shape of bracts and the dilation of filament lobes; Uline and Bray perceptively disputed the use of such variables, but they neglected to note the differences in habit and general appearance which distinguish this variety.

This variety occurs in the North-South progression of the Blackland Prairies of Oklahoma and Texas, the Post Oak Savannah, and the Gulf



Prairies of Texas. It has been collected no farther West than Llano Co., Texas, and only rarely in Arkansas and Tamaulipas, Mexico.

GUILLEMINEA LANUGINOSA var. **rigidiflora** (Hooker) Mears, comb. nov.

Gossypianthus rigidiflorus Hooker, Ic. Pl., iii, t. 251 (1840).

Plants larger and more robust than those of the type variety; stems thick, never flexuous; stems and leaves usually densely pilose but rarely worn to glabrosity by rain and wind; radical leaves 16-60 mm. long by 4-10 mm. wide, oblanceolate and barely acute to spatulate and obtuse; cauline leaves 7-18 mm. long by 3-13 mm. wide, lanceolate, acute to ovate; marginal membrane on sepals wider than in var. *lanuginosa*.

Variety *rigidiflora* is the most common; it seems to be intermediate between var. *Sheldoni* and var. *lanuginosa*. Yet, this variety occurs where the other two do not occur. It has been collected as far west as Pecos, Texas, and southwestern Chihuahua, Mexico; it has been collected as far north as Sapulpa, Oklahoma, and as far south as central Tamaulipas, Mexico. This variety generally connects and intergrades with all the other varieties of *G. lanuginosa*.

GUILLEMINEA LANUGINOSA var. **Sheldoni** (Uline & Bray) Mears, comb. nov.

Gossypianthus lanuginosus var. *Sheldoni* Uline & Bray Bot. Gaz. 20:342 (1895).

Gossypianthus Sheldoni (Uline & Bray) Small in Fl. SE. U.S. p. 394 (1903).

Radical leaves 30-84 mm. long by 6-12 mm. wide, lanceolate to oblanceolate; cauline leaves 15-20 mm. long by 8-10 mm. wide, ovate and acute to obovate and obtuse; leaves densely tomentose; stems thicker than in the other varieties of *G. lanuginosa*.

Many specimens labeled var. *Sheldoni* are var. *rigidiflora*; the former variety is very rare. Perhaps var. *Sheldoni* is an extremely large form of var. *rigidiflora* (in which case the combined variety should be called var. *Sheldoni*); but var. *Sheldoni* is distinctly larger than var. *rigidiflora* and occurs only in the extreme western limits of the latter's range. Small's observation that the sepals are nerveless or without chlorophyll is without basis. The type specimen does have three chlorophyllous nerves in each sepal; however many of the flowers are basal, old, and bleached by the weather. This variety has been collected along a line from Major Co., Oklahoma, through Taylor Co., Texas, to Terrell Co., Texas.

Figure 3. DISTRIBUTION OF SUBGENUS GOSSYPIANTHUS. Hollow square, *G. lanuginosa* var. *tenuiflora*; solid square, *G. lanuginosa* var. *lanuginosa*; open circle, *G. lanuginosa* var. *rigidiflora*; solid circle, *G. lanuginosa* var. *Sheldoni*; hollow triangle, *G. Brittonii* var. *Brittonii*; solid triangle, *G. Brittonii* var. *heterophylla*.

GUILLEMINEA Brittonii (Standley) Mears, comb. nov.

Gossypianthus Brittonii Standley in Contrib. U.S. Nat. Herb., xviii, 92 (1916).

Plants nearly glabrous, very small, usually less than 10 cm. extended; most of the supporting stems originating below ground; stems less than 1 mm. thick, flexuous; radical leaves 5-20 mm. long by 1-5 mm. wide, oblanceolate acute to obtuse; radical leaf petioles broadly winged or bare; flowers 5-30 in somewhat cylindrical spike-like racemes; each flower pedicellate; membranous part of the sepal up to 20% of the sepal area; style 0.5-0.9 mm. long at maturity.

Standley named this species in 1916 and subsequently referred all Cuban specimens to it. He personally labeled several specimens which correspond to *Gossypianthus heterophyllus* Ekman & Suessenguth; Ekman and Suessenguth described another species, *Jackianus*, in 1934 from specimens which correspond to Standley's species. Here *G. heterophyllus* is considered a variety of *G. Brittonii*.

Key to the Varieties of *Guilleminea Brittonii*

- 1a. Radical leaves with a widely winged petiole void of chlorophyll; style 0.6-0.9 mm. long; flowers in cylindrical spike-like racemes of 10-30. var. *Brittonii*
 1b. Radical leaves with an unwinged petiole; style about 0.5 mm. long; flowers in short capitula of 3-8. var. *heterophylla*

GUILLEMINEA BRITTONII var. **BRITTONII**.

Gossypianthus Jackianus Ekman & Suesseng. Rep. Spec. Nov. 35:317 (1934)

Radical leaves 5-7 mm. long by 1-2 mm. wide, spathulate to lanceolate, with a long, widely winged petiole; cauline leaves 3-6 mm. long by 1-4 mm. wide, ovate, with a very broadly winged petiole; stems 5-10 cm. long; flowers in cylindrical spikes of 10-30; style very long, usually 0.7-0.9 mm. long.

This variety has been collected only in Las Villas and Mantanzas Provinces of central Cuba. It is larger at maturity than the other variety. *Gossypianthus Jackianus* was described from an extremely poor specimen; the arid environment probably accounts for the few minute differences between the type of *G. Jackianus* and var. *Brittonii*.

GUILLEMINEA BRITTONII var. **heterophylla** (Ekman & Suesseng.) Mears, comb. nov.

Gossypianthus heterophyllus Ekman & Suesseng. Rep. Spec. Nov. 35:317 (1934).

Plants very small, less than 5 cm. high; leaves slightly pilose; radical leaves 8-20 mm. long by 3-5 mm. wide, lanceolate to oblanceolate; radical petiole not winged; cauline leaves 5-7 mm. long by 3-4 mm. wide, ovate and acute; flowers in capitula of 3-8 flowers; style about 0.5 mm. long, shorter than that of var. *Brittonii* but longer than that of any specimen of *G. lanuginosa* examined.

The floral characters of this variety are very similar to those of the type variety. Only the slight difference in style length is noticeable; Suessenguth mentioned the pilosity of the bracts as a key distinction in *G. heterophyllus*, but an isotype labeled by Suessenguth shows that the pilosity develops either between the bracts and the sepals or on the rigid sepal tissue.

This variety has been collected only from Las Villas and Mantanzas Provinces of central Cuba.

EXCLUDED SPECIES

Gossypianthus decipiens Kuntze Rev. Gen. p. 543 (1891) = *Hebanthe decipiens* Hooker f.

G. guianensis Kuntze, l.c. = *Hebanthe guianensis* Klotzsch

G. Hookerianus Kuntze, l.c. = *Hebanthe Hookerianus* Hemsley

G. mollis Kuntze, l.c. = *Hebanthe mollis* Hemsley

G. subnudus Kuntze, l.c. = *Hebanthe subnudus* Hemsley

G. tomentosus Griseb. Goett. Abh, xxiv, 35 (1879) = *Gomphrena tomentosa* (Griseb.) Fries

Key to New World Genera of Gomphrenoideae

It is useful to give here a key to the genera of the Gomphrenoideae of the Amaranthaceae in the New World, including the newly emended genus *Guilleminea*. It had previously been separated in the monogeneric Guillemineae or Brayulineae because of the coalescent calyx. Since the coalescence has been described as a development of filament tube extension and filament lobe enclosure by the calyx lobes, *Guilleminea* should be a member of the tribe Gomphreneae of the Gomphrenoideae.

- 1a. Stamen 1; flowers 4-merous. *Woehleria*
- 1b. Stamens 2-5; flowers 5-merous. 2
 - 2a. Most of the flowers unisexual. 3
 - 3a. Leaves opposite. *Iresine*
 - 3b. Leaves alternate. *Dicraurus*
 - 2b. Few, if any, flowers unisexual. 4
 - 4a. Style 1 or 0; stigma 1 and capitate, penicillate, or bilobed (not subulate) 5
 - 5a. Stigmatic surface penicillate. *Froelichiella*
 - 5b. Stigmatic surface not penicillate 6
 - 6a. Inflorescences mostly axillary. 7
 - 7a. Perianth unequal or calyx united. 8
 - 8a. Filament tube a short cup or adnate to the fused calyx. *Guilleminea*
 - 8b. Filament tube longer than ovary and free from the calyx. 9
 - 9a. Style short or none. *Alternanthera*
 - 9b. Style long. *Telanthera*
 - 7b. Perianth equal; style long; sepals free. . . *Mogiphanes*
 - 6b. Inflorescences mostly terminal. 10

- 10a. Pseudostaminodia 0. *Froelichia*
 10b. Pseudostaminodia present. 11
 11a. Leaves clearly petioled. *Hebanthe*
 11b. Leaves sessile or subsessile. *Pfaffia*
 4b. Stigmas 2 or 3; styles 1 or 2. 12
 12a. Filaments united into a short cup. 13
 13a. Flowers stipitate; inflorescence spicate. . . . *Philoxerus*
 13b. Flowers sessile; inflorescence a
 single flower. *Tidestromia*
 12b. Staminal tube long. 14
 14a. Herbaceous plant. *Gomphrena*
 14b. Woody shrub. *Pseudogomphrena*

The lack of distinguishing characters in the type descriptions of *Mogiphanes* and *Telanthera*, *Hebanthe* and *Pfaffia*, and *Gomphrena* and *Pseudogomphrena* suggest necessary work in descriptions and/or revisions.

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